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THE SOVIET SPACE RESEARCH PROGRAM

MONOGRAPH II OBJECTIVES



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21 August 1959

CENTRAL INTELLIGENCE AGENCY

OFFICE OF SCIENTIFIC INTELLIGENCE

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PREFACE

The objectives of the Soviet space research program have been obscured by frequent and variant Soviet statements, often by responsible officials. Nevertheless, the immediate and long-range objectives can be determined to a considerable degree by a review and evaluation of Soviet statements and activities relating to principal astronautical goals, the purposes of current space projects, and the political, military, and scientific aims of the USSR. In considering Soviet statements, the greatest weight must be given to those by officials and scientists who are in a position to know Soviet plans and who have proved to be fairly reliable spokesmen in the past.

This monograph is based on information available to 15 May 1959 and is one of 12 monographs (listed below) on the Soviet space research program. Monographs II through XII are designed to support the conclusions found in Monograph I, which will be an overall evaluation of significant Soviet space research capabilities and will be published last.

Monographs on the Soviet Space Research Program:

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|---|---|
| I Estimate 1959-74 | VII Telemetry, Communications, and Reconnaissance Instrumentation |
| II Objectives | VIII Ground Support Facilities |
| III Organization, Planning, and Control | IX Space Medicine |
| IV Space Vehicles | X Space Biology and Astrobiology |
| V Propulsion System | XI Astronomical Aspects |
| VI Guidance and Control | XII Current Status of Progress |

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THE SOVIET SPACE RESEARCH PROGRAM

MONOGRAPH II OBJECTIVES

SUMMARY AND CONCLUSIONS

The Soviets are fully aware that their penetration of interplanetary space will present unique opportunities to advance their national objectives, particularly those of a political, military, and scientific nature. At this stage of their conquest of space, they probably have not been able to formulate detailed plans along these lines, but there are indications that they intend to take full advantage of opportunities as they arise. Since there are many unknowns in space research, the Soviets will undoubtedly find it necessary to reexamine their space program from time to time.

One of the objectives of the USSR space program which became apparent at an early date was the use of Soviet accomplishments for political propaganda purposes, especially in an attempt to convince the world of the superiority of the USSR and the Communist system and to intimidate the rest of the world by the missile capabilities implied by space successes.

The Soviets have been cautious in speaking of the military objectives of their space program, but they have discussed them, and it is believed that they will use space vehicles for offensive and defensive purposes and for

military communications, electronic countermeasures, navigation, and reconnaissance.

The early Soviet space efforts, particularly Sputniks II and III, demonstrated a strong Soviet desire to advance basic science and to increase knowledge of the earth, the solar system, and the universe. In the fields of astronomy and geophysics, immediate Soviet objectives include greatly improved observations by means of instrumented satellites and probes; fundamental physical experiments have also been planned. Much of the scientific interest appears to result from Soviet objectives to find methods of tapping new energy sources in space and exploiting the natural resources of the moon and planets. Some of the immediate practical objectives of the scientific program in space include improved communications; weather observations; geodetic measurements; sea-ice and polar surveys; high precision cartography; nuclear test detection, and the determination of environmental radiation hazards.

The principal objective of the USSR in the field of astronautics is to place manned and unmanned controlled vehicles into interplanetary space. For manned controlled ve-

hicles its projects concern: (a) the vehicle recovery problem; (b) space bio-medical problems; (c) protection against radiation hazards; and (d) space environment research. For both manned and unmanned controlled vehicles, the Soviets are developing: (a) space navigation communications, guidance, control, tracking, data handling, and calculating devices and procedures; (b) more powerful propellants and sources of power; (c) lunar and interplanetary probes, with Venus and Mars as the most probable early planetary objectives; and (d) artificial satellites for scientific, communications, and reconnaissance purposes. The Soviets have indicated that some of their current projects will lead eventually to the establishment of multi-purpose

stations in space and on the moon and planets.

The Soviets have discussed the problem of sending probes beyond the solar system into interstellar space, but there is no evidence that such a program is being seriously considered at this time.

Indications are that the Soviets intend to continue to use the resources of the entire Bloc area in space research and possibly to encourage some high-altitude-rocket sounding programs in other leading Bloc nations. Communist Chinese reports that they will launch research rockets and artificial earth satellites probably indicate that the Soviets are considering assisting in such a program for political and propaganda purposes.

DISCUSSION

INTRODUCTION

Events leading directly to the Soviet launching of Sputniks I, II, and III and the Lunik-Mechta rocket are generally known. Much less known, however, is the history of astronautics in Russia, which dates from the end of the nineteenth century, when I. V. Mescherskiy investigated theoretically the dynamics of bodies of variable mass and K. E. Tsiolkovskiy began his work on the principles of rocket flight.^{1,2} Although Tsiolkovskiy is usually credited by the Soviets as being the founder of scientific astronautics, several of his contemporaries also made fundamental contributions.^{2,3} In 1929, Ya. I. Perel'man, I. P. Fortikov, and other followers of Tsiolkovskiy founded a rocket organization known as GIRD (Group for the Study of Reactive Motion). Some of the papers produced by GIRD indicated a high degree of technical competence in the various aspects of rocketry and space exploration.⁴ Members of GIRD who are still very active include I. A. Merkulov, Yu. A. Pobedonostsev, and M. K. Tikhonravov.

The Soviet Government is reported to have organized a rocket research program in 1934, only five years after Germany had done so.⁵

The Soviets have supported an aggressive rocket research policy since 1945. They appropriated most of the German rocket factories and test facilities and put several hundred German rocket experts to work for them in the USSR. Subsequent developments indicate that the Soviet effort has been more than an extension of the German program and that it is based upon independent thinking and research.⁶

By 27 November 1953, the Soviet program had advanced to such a point that A. N. Nesmeyanov, President of the Academy of Sciences, USSR, was able to make confidently the following public statement: "Science has reached a state when it is feasible to send a stratosphere to the moon, [and] to create an artificial satellite of the earth. . . ."⁷

Soviet interest in space flight was further emphasized by the action of the Presidium of the Academy of Sciences, USSR, on 24 September 1954 in establishing the K. E. Tsiolkovskiy Gold Medal for outstanding work in the field of interplanetary communications (travel), to be awarded every three years beginning with 1957.⁸ The name of the first winner of the award was withheld, probably for security reasons.

An Astronautics Section of the V. P. Chkalov Central Aeroclub of the USSR was organized early in 1954. Its stated objective was "to facilitate the regulation of cosmic flights for peaceful purposes." Its charter members included chairman N. A. Varvarov, V. A. Dobronravov, I. A. Merkulov, A. D. Serdyapin, K. P. Stanyukovich, Yu. S. Khlebtsevich, and International Astronautics Prize Winner A. A. Shternfeld.

In April 1955, the Soviets announced the formation of the Interagency Commission for Interplanetary Communications (ICIC) composed of outstanding Soviet scientists and engineers. L. I. Sedov, a leading hydrodynamicist, was named chairman, and M. K. Tikhonravov, who as early as 1934 designed and successfully launched liquid-propellant atmospheric research rockets, was appointed vice chairman. One of the first tasks assigned to the group was the creation of an "automatic laboratory for scientific research in cosmic space" (an artificial earth satellite) as the first step in solving the problems of interplanetary travel. The work in the field of astronautics is on a national scale. The ICIC acts as a coordinating committee to direct the activities of the various institutes.

The U.S. announcement of 29 July 1955 that it intended to launch an earth satellite during the International Geophysical Year (1957-58) led to much speculation concerning Soviet capabilities and plans in this field, but the Soviets refused to disclose their intentions at that time. A short time later, on 2 August, Sedov held a press conference in which he made a guarded statement indicating that the Soviets were working on a satellite, possibly larger than that of the United States, to be launched in the comparatively near future.

An active Soviet satellite program was confirmed on 11 September 1956 by Academician I. P. Bardin, chairman of the IGY National Committee of the USSR, during a meeting of the Comité Spécial de l'Année Géophysique Internationale (CSAGI) in Barcelona, Spain. Bardin stated that the USSR intended to launch a satellite for upper atmospheric re-

search during the IGY, but he declined to outline the Soviet program or to disclose further details.¹²

In 1956, the Academy of Sciences, USSR, applied for membership in the International Astronautical Federation (IAF) and was accepted during the Seventh International Astronautical Congress in Rome in September of that year. The Soviet's lone delegate, L. I. Sedov, was elected a vice president, but more than a year passed before the USSR complied with the by-laws of the IAF and submitted a description of the Academy's ICIC and a list of members.¹³

In December 1956, the Soviets disclosed details of the extent and nature of their upper atmosphere rocket research program. This came about when a delegation of 13 scientists, headed by Academician A. A. Blagonravov, attended the first International Congress on Rockets and Guided Missiles in Paris. Papers presented by S. M. Poloskov and B. A. Mirtov revealed some unique features of Soviet upper-atmosphere research rockets, and the presentation by A. V. Pokrovskiy indicated an extensive Soviet experimental aeromedicine program. Subsequent to the release of this information, various articles appeared in Soviet newspapers and scientific journals supplying additional information on the Soviet rocket effort. Among the significant items was the Soviet admission that rocket studies of the atmosphere had been conducted since about 1947.¹⁴

The Soviet rocket and satellite program for the IGY was outlined in a general manner in June 1957 in a letter from I. P. Bardin to IGY headquarters (CSAGI), Brussels. The program indicated that the Soviets would fire 125 meteorological research rockets from three different geographical zones and would place into orbit an unspecified number of artificial earth satellites.¹⁵

On 1 June 1957, Nesmeyanov was quoted in the Soviet press as saying that the necessary equipment and apparatus had been created to solve the problem of artificial earth satellites.¹⁶ A week later, Nesmeyanov stated, "Soon, literally within the next months, our"

planet will acquire another satellite. . . . The technical difficulties that stood in the way of the solution of this grandiose task have been overcome by our scientists."¹⁸ Other indications of an impending satellite launching included announcements in Soviet astronomical and radio journals giving instructions on methods of observing satellites and receiving their transmissions.^{19, 20} These indications were available to few people in Western countries.

On 27 August 1957, the Soviet press carried announcements that successful tests of an intercontinental ballistic missile had been carried out "in conformity with the plan of scientific research work in the USSR."²¹ Then came the successful orbiting of Sputnik I on 4 October 1957, followed by Sputnik II on 3 November 1957, and Sputnik III on 15 May 1958. These launchings introduced the new space age and impressed the world with Soviet scientific and military accomplishments, thereby scoring a major propaganda and psychological triumph. Sputnik III in particular has been evaluated as a major scientific accomplishment.²²

The next important Soviet step in the space research field was the launching of the so-called cosmic rocket on 2 January 1959. There is little doubt that it was intended as a lunar rocket, considering advance statements by Soviet newspapers and astronautical experts, the 62-hour life of the power supply, the significance of the unofficial name "Lunik," the scientific experiments planned, and the marker carried for the purpose of leaving evidence of the first rocket to impact on the moon.²³⁻²⁵ The Soviets were clever enough to reorient their propaganda line after it became apparent that the rocket would not strike the moon, but would be drawn into an orbit around the sun by the gravitational attraction of that body. At first, some began to call it "Mechta." ** Thereafter they referred to it as the first cosmic rocket, the first artificial planet, and the first solar rocket. In spite of

"Lunik" is a coined word, a play on the word sputnik, meaning a little moon or a moon satellite. Some Soviets also referred to the rocket as "lunalet" (moonship, or moonflight). ** "Mechta" means an unattainable dream.

failure to achieve its lunar mission, the rocket demonstrated that the Soviets were making progress in their space flight program.

PRINCIPAL ASTRONAUTICAL OBJECTIVES

Manned Interplanetary Flight

Manned space flight on an interplanetary scale is the announced goal of the Interagency Commission for Interplanetary Communications (ICIC), of the Academy of Sciences, USSR.¹⁰ Various spokesmen have repeatedly confirmed this as a principal Soviet objective.²⁶⁻²⁹ Controlled flight in vehicles capable of returning to earth is implied in the ICIC statement.

Unmanned Controlled Vehicles

A number of leading astronautics experts, have mentioned the desirability of using unmanned controlled vehicles in interplanetary space exploration, pointing out that the use of such devices eliminates many of the basic difficulties — such as biological, shielding, recovery, and excessive weight problems — encountered in manned vehicles. The development of unmanned space vehicles is expected to continue to receive a great deal of attention by the Soviets because their initial investigations of space will be conducted with such vehicles. Highly developed unmanned rockets and satellites, therefore, will be important stepping stones in the accomplishment of manned space flight and, according to some Soviet views, they will always be preferable because of cost and safety factors for certain types of space exploration. A. G. Karpenko,³¹ V. I. Krassovskiy,³² and Yu. S. Khlebtsevich^{33, 34} have advocated the use of vehicles of this type. The Institute of Automatics and Telemechanics, of the Academy of Sciences, USSR, reportedly is working on associated problems.³⁵

Interstellar Flight

Responsible Soviet scientists have not encouraged the belief that flight beyond the solar system into interstellar space is attainable in the foreseeable future. Typical of the statements relating to this problem is that by